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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,603	04/29/2005	Thomas Engel	GK-ZEI-3269/500343.20289	4547

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REED SMITH, LLP  
ATTN: PATENT RECORDS DEPARTMENT  
599 LEXINGTON AVENUE, 29TH FLOOR  
NEW YORK, NY 10022-7650

EXAMINER
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SETH, MANAV

ART UNIT	PAPER NUMBER
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2624

MAIL DATE	DELIVERY MODE
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12/17/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/533,603	<b>Applicant(s)</b> ENGEL ET AL.	
	<b>Examiner</b> MANAV SETH	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 23-45 and 50-60 is/are pending in the application.
- 4a) Of the above claim(s) 41-45 and 56-60 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-28 is/are rejected.
- 7) ☒ Claim(s) 29-40 and 51-54 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Election/Restriction***

1. Applicant's provisional election of species I corresponding to claims 23-40 and 50-54 in the reply filed on 10/07/2009 for examination, with no arguments presented, is acknowledged. All other claims are therefore withdrawn from the examination and the election/restriction is herein made final.

### ***Claim Objections***

2. The claims 30-31 are objected because of the following informalities:

A succeeding (higher number) claim should depend on a preceding (lower number) claim and not vice-versa. Claims 30-31 both depend on a higher number claim 37. Appropriate correction to the claims is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 25-26 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 25 and 26 recites the limitation "wherein the determination of Zernike polynomials...". There is insufficient antecedent basis for this limitation in the claims. Claim 25 depends on claim 23 and claim 23 do not recite anything with respect to "the determination of Zernike polynomials". Claim 26 depends on claim 24 and claim 24 do not recite anything with respect to "the determination of Zernike polynomials".

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Claim 29 recites the limitation “wherein the number of variables.....”. There is insufficient antecedent basis for this limitation in the claim. Claim 29 depends on claim 24 and claim 24 do not recite anything with respect to “the number of variables”.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joseph Geary, SPIE, 1995, “Chapter 10 – Intensity –Based Wavefront Sensing” (pages 151-167) (Cited in IDS).

Regarding claim 1, claim 1 recites a method for determining image quality of an optical imaging system, said method comprising the following steps: recording an image stack which includes a plurality of individual images of a sample from different adjusting or reference planes near a focus plane, improving image qualities of the individual images of the image stack by means of image processing and evaluating the image stack with the aim of determining characteristic numbers that characteristic of the wavefront deformation caused by the imaging system. Geary discloses “recording an image stack which includes a plurality of individual images of a sample from different adjusting or reference planes near a focus plane” (page 162 – last paragraph and figure 10.19- defocus images) and “evaluating the image stack with the aim of determining characteristic numbers that characteristic of the wavefront deformation caused by the imaging system” (page 165 – determining characteristic numbers (Zernike polynomials) that are characteristic of the wavefront

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deformation caused by the imaging system). Geary do not explicitly teaches improving image qualities of the individual images of the image stack by means of image processing after the images are captured by the imaging system. However, it is very well know in the art that after capturing images a pre-image processing is done on the images before it further can be used for any purposes, where such image processing includes removing or reducing noise and geometrical distortions, changing intensity levels which is added by the imaging system components (official notice taken). Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to improve image qualities of the individual images of the image stack by means of image processing before evaluating for wavefront deformations. One of ordinary skill in the art would have been motivated at the time of invention was made to improve image qualities of the individual images of the image stack by means of image processing before evaluating for wavefront deformations in order to determine the proper characteristic numbers for wavefront deformations measurements.

Regarding claim 24, Geary discloses wherein the characteristic numbers are determined in a first step initially by analytic evaluation and, in a subsequent second step, by further iterative processing of the results from the first step until a given termination criterion is reached (page 165 – first paragraph).

Regarding claim 25, Geary discloses wherein the determination of Zernike polynomials up to a given order is carried out with the analytic evaluation of the image information (Zernike polynomials up to a given order is apparent in this case, also see page 159 – first para).

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Regarding claim 26, Geary discloses wherein the determination of Zernike coefficients is carried out with the iterative evaluation of the image information based on methods in which every wave surface from the image stack of the sample is considered as a unit, or a pixel-by-pixel evaluation is carried out, and wherein the determined Zernike coefficients correspond to the outputted characteristic numbers (page 165 – table 10.1).

Regarding claim 27, Geary discloses wherein the change of reference plane always takes place in the object space, i.e., by changing the distance of the sample relative to the object plane (page 165 – table 10.1 – focus offset setting range implies the distance change relative to the object plane).

Regarding claim 28, Geary discloses wherein the change of reference plane is carried out in predetermined increments (page 165 – table 10.1- focus offset are in predetermined increments).

7. Claims 29-40 and 50-54 are objected to as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Examiner note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings for the art and are applied to the specific limitations within the individual claim, other passages and figures may be applied as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references entirely as potential teachings all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali, can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Manav Seth/  
Primary Examiner, Art Unit 2624  
December 13, 2009